Chemical & Engineering NEWS

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C&EN's Top Fifty Chemical Products & Producers

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C&EN's Top Fifty

Production of top 50 industrial chemicals *in the U.S. increased 8% in 1979 to 565 billion lb; 50 largest companies boosted sales 25% to $90 billion.* ***Page 33***

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Chemical firms feel cash pinch

Though profits are way up and new investment projects moderate, day-to-day needs for financing prevent cash increase at chemical firms

William F. Fallwell
C&EN, New York

Late in a business expansion when things get a bit overheated, companies typically make more money but see it immediately sopped up by ambitious investment projects and increased day-to-day financing needs. The financing drain results from a big increase in tideover money needed as inventories build up and customers delay payments. As a result, "liquidity" (cash and relative cash coverage of liabilities) declines.

This time around in the U.S. basic chemical industry, the business peak in the past year brought a peculiar version of this general case. Chemical companies have kept their investment goals moderate, increasing them relatively less than either profits or cash flow (profits plus depreciation). However, despite companies' best efforts at control, financing needs have swollen.

The result is much the same as in past expansions. Companies' cash is being hit and key financial ratios knocked down. A few companies have bucked the tide, but the industry as a whole has found the financing surge a strenuous challenge.

A C&EN survey of 20 leading basic chemical companies finds no net gain in cash, including short-term investments convertible into cash, from the end of 1978 to the end of 1979. By contrast, in 1978, cash and marketables jumped 30% at these companies from a year earlier.

At the same time, the average unweighted "current ratio" at these companies dropped a notch to 2.0 at the end of 1979 from 2.1 at the end of 1978. The current ratio is current assets divided by current liabilities.

More serious, companies' coverage of current liabilities with cash and marketables sank to 19% at the end of 1979 from 23% a year earlier. At the end of 1977, this figure had been 28%.

For comparison, the same 20 companies stood more conservative on these ratios at the top of the previous expansion in the heady days of 1974. That year, the current ratio wound up at 2.2, and cash coverage of current liabilities ended at 28%. Still, these companies' cash was depleted 17% in 1974 from 1973—a worse showing than in 1979.

Since 1974, these companies' total of cash and marketables has grown only 13%, although profits have increased more than 40%. This despite

Companies had no cash gain in 1979 as financial ratios declined

	1979			1978			1977			1974		
	Cash and marketables ($ millions)	Current ratio	Cash ratio	Cash and marketables ($ millions)	Current ratio	Cash ratio	Cash and marketables ($ millions)	Current ratio	Cash ratio	Cash and marketables ($ millions)	Current ratio	Cash ratio
Air Products	$ 47.0	1.4	0.15	$ 38.7	1.2	0.14	$ 55.9	1.5	0.27	$ 45.8	1.4	0.28
Akzona	18.5	2.2	0.10	11.4	2.5	0.09	9.4	2.7	0.09	9.0	3.2	0.11
Allied Chemical	125.8	1.2	0.09	90.3	1.4	0.14	42.7	1.7	0.09	72.8	2.0	0.22
American Cyanamid	146.2	1.6	0.18	97.7	1.8	0.15	110.7	2.0	0.22	179.4	2.4	0.54
Cabot	19.3	2.0	0.08	26.9	2.5	0.18	67.1	2.6	0.61	25.2	2.4	0.28
Celanese	214.0	1.8	0.36	143.0	2.0	0.33	122.0	2.0	0.32	117.0	1.7	0.31
Diamond Shamrock	31.3	1.9	0.08	45.8	2.0	0.15	33.5	2.0	0.13	35.5	1.4	0.16
Dow Chemical	251.7	1.4	0.10	398.5	1.6	0.20	135.4	1.5	0.08	423.3	1.4	0.27
Du Pont	369.8	2.6	0.21	328.0	2.5	0.21	237.8	2.6	0.19	128.0	2.6	0.13
Ethyl Corp.	119.0	2.8	0.62	174.1	3.0	0.98	176.1	3.7	1.34	42.5	2.6	0.33
W. R. Grace	154.2	1.6	0.14	263.2	1.8	0.30	191.0	1.8	0.24	168.2	1.6	0.20
Hercules	56.3	1.9	0.14	57.9	1.9	0.15	29.1	2.2	0.11	22.2	2.0	0.08
Monsanto	271.3	2.2	0.24	347.6	2.5	0.39	198.3	2.6	0.30	324.1	2.9	0.63
Olin	25.6	1.8	0.08	31.0	1.7	0.09	32.1	2.0	0.12	98.2	2.3	0.46
Pennwalt	17.9	2.2	0.09	6.5	2.2	0.04	20.5	2.7	0.16	2.2	2.0	0.01
Reichhold Chemicals	10.2	2.1	0.09	6.8	2.1	0.07	9.2	2.1	0.10	22.8	2.3	0.45
Rohm & Haas	69.6	2.3	0.25	64.0	2.4	0.27	14.6	2.6	0.08	19.7	2.3	0.10
Stauffer Chemical	55.9	1.7	0.14	89.0	2.0	0.28	96.8	2.7	0.48	53.6	2.5	0.39
Union Carbide	449.0	2.2	0.26	283.7	2.0	0.18	323.1	2.2	0.23	426.1	2.2	0.38
Witco Chemical	72.6	2.0	0.41	25.4	2.0	0.22	33.9	2.5	0.44	14.6	1.9	0.18
TOTAL (average for ratios)	**$2525.2**	**2.0**	**0.19**	**$2529.5**	**2.1**	**0.23**	**$1939.2**	**2.3**	**0.28**	**$2230.2**	**2.2**	**0.28**
ANNUAL CHANGE	**0%**			**30%**								

Note: Current ratio is current assets divided by current liabilities. Cash ratio is cash and marketables divided by current liabilities.

the tempting opportunities to use free money to take advantage of mushrooming interest rates on short-term investments. Some of the largest chemical companies built up large cash hoards in 1978 (C&EN, May 7, 1979, page 10), but the going got much rougher in 1979.

A C&EN survey on some of the current main financing needs at chemical companies shows the pressure on funds during 1979. At the 20 leading chemical companies, inventories (in dollars) rose 19% during the year, even though companies made vigorous efforts to hold the line.

Receivables (uncollected bills to customers) rose 22% at these companies in 1979. Combined increases in receivables and inventories created a $4.1 billion financing drain for the year.

On the other side of the ledger, this group of chemical companies pushed up their own payables 34% in 1979. However, since payables are not nearly as large as receivables, this stretchout made up only $1.9 billion of the squeeze on funds from receivables and inventories.

In addition, these companies' liabilities went up somewhat because of increased short-term debt, which rose a combined 16% or $300 million. However, 70% of this increase was accounted for by only two companies, Stauffer Chemical and acquisition-bent Allied Chemical. Seven companies actually drew down their short-term debt. Hence, chemical companies continued their reluctance in recent years to add much to borrowed funds—either short- or long-term.

Company-by-company through these surveys, the variations from the average were considerable in 1979. Unlike a year earlier, when any cash buildup was mainly by the largest companies, more of the medium-sized firms took part in 1979. All told, 11 of the 20 companies increased cash and marketables in 1979 over 1978. Of the top nine companies with more than $100 million in this category, five increased their holdings.

The top cash-laden chemical company in 1979 was Union Carbide, with $449 million, 58% more than in 1978. At others in the large-company group, cash increased 13% at Du Pont to $370 million, 50% at Celanese to $214 million, 50% at American Cyanamid to $146 million, and 39% at Allied Chemical to $126 million.

Some medium-sized companies had large percentage cash gains in 1979—21% at Air Products, 50% at Reichhold Chemicals, 62% at Akzona, 175% at Pennwalt, and 186% at Witco Chemical.

However, there also were nine companies in the 20-company survey with cash declines in 1979. Some of the drops were steep—27% at Dow Chemical, 28% at Cabot, 32% at Diamond Shamrock and Ethyl Corp., 37% at Stauffer Chemical, and 41% at W. R. Grace & Co.

In the current ratio, performance in 1979 was not nearly as evenly split as in cash and marketables. Only four companies managed a gain—Air Products, Du Pont, Olin, and Union Carbide. At 12 other companies, the ratio went down, and at four companies, the ratio stayed the same.

The cash ratio (cash divided by current liabilities) increased for eight companies in 1979, declined for 11, and stayed even for one.

Compared to performance in 1978, the company breakdown looks much the same in 1979 on liquidity measures. In both years, cash increased at about as many companies as declined, and the cash ratio fell at a few more companies than it went up. The higher total cash gain for the industry in 1978 was the result of some extraordinary increases at a few large firms.

In the current ratio, 1979 continued the dominance of declining numbers shown in 1978. However, a few more firms pulled this ratio up in 1979.

Among companies increasing their current ratio in 1979, there is considerable evidence of a campaign to tighten the balance sheet. Leaders in this area are Du Pont and Union Carbide. Nearly across the board, these two companies were more conservative or more controlled than the rest of the industry.

Union Carbide, besides gaining a large increase in cash to the industry's highest level, also came out higher than the industry average in both its current ratio and cash ratio in 1979. Both ratios for Carbide went up from 1978. Further, Carbide got through 1979 with below-average increases in inventories, receivables, and payables. Finally, the company cut its short-term debt 47% over the year.

Du Pont figures tell a similar story. While cash increased 13% in 1979, the current ratio stepped up to 2.6, the second highest among the 20 companies after Ethyl's 2.8. Du Pont's cash ratio stayed the same at 0.21. The company had below-average increases in inventories and receivables and a slightly higher than average increase in payables. Like Carbide, Du Pont lowered its short-term debt, by 11%.

With the U.S. economy likely entering a recession, chemical companies probably will head in the opposite financial direction. In a recession, typically, cash and the key financial ratios all increase, inventories decline, and gains in receivables and payables drop way down. That's what happened in 1975. Hence, by the end of 1980, many more companies may follow the more conservative trail blazed by a few in 1979. □

Firms hiked debt and payables as inventories, receivables rose

	1979 FISCAL YEAR END							
$ Millions	Inventories	% change from 1978	Receivables	% change from 1978	Payables	% change from 1978	Short-term debt	% change from 1978
Air Products	$100.2	6%	$256.0	27%	$146.5	11%	$34.7	−13
Akzona	207.6	28	166.1	22	110.7	26	60.8	75
Allied Chemical	602.4	81	755.7	52	767.8	93	179.7	1942
American Cyanamid	515.4	3	689.9	21	569.7	24	200.7	43
Cabot	262.9	30	194.0	46	172.2	54	37.7	52
Celanese	352.0	11	483.0	21	349.0	33	65.0	51
Diamond Shamrock	316.2	32	443.1	39	232.2	46	35.7	−31
Dow Chemical	1,313.1	31	2,053.2	25	1,173.9	40	601.0	30
Du Pont	2,000.5	17	1,958.5	21	774.9	35	230.1	−11
Ethyl Corp.	162.7	20	250.8	22	135.4	9	21.3	2
W. R. Grace	767.4	8	729.4	16	446.9	23	264.6	12
Hercules	321.1	1	407.1	23	230.3	6	86.3	71
Monsanto	909.9	26	1,277.2	15	1,042.8	30	64.5	47
Olin	261.2	−1	290.3	13	134.5	−4	62.6	−19
Pennwalt	191.0	12	211.8	22	67.2	28	60.9	36
Reichhold Chemicals	81.5	0	129.2	19	76.5	19	14.6	−23
Rohm & Haas	282.1	20	277.8	15	206.4	33	38.8	−14
Stauffer Chemical	318.7	15	308.6	18	116.9	20	196.7	45
Union Carbide	1,773.6	15	1,433.3	14	528.0	22	207.5	−47
Witco Chemical	110.7	28	155.8	41	157.8	65	8.0	65
TOTAL	$10,850.2	19%	$12,470.8	22%	$7,439.6	34%	$2471.1	16

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C&EN's Top Fifty Chemical Products & Producers

Demand for chemicals in the U.S. held firm during 1979. Producers managed both to make effective use of expanded production capacity and to boost plant operating rates. And despite sharp increases in the cost of raw materials, the price of many U.S.-made chemicals gave them a distinct competitive advantage in several export markets. As a result, output of industrial chemicals remained on a high plateau throughout the year.

Output of the 50 industrial chemicals manufactured in greatest volume in the U.S. rose almost 8% in 1979 to a record 565 billion lb. The annual growth was nearly double the previous year's rate. All but eight of the products on C&EN's Top 50 compilation were produced in larger amounts in 1979 than in 1978, with output up more than 10% for 17 of them. And even for the handful for which output was lower, the decline was moderate at worst.

Organic chemicals had a particularly good year, reflecting in part a better-than-average growth for both plastics and synthetic fibers. Total production of the 29 organic chemicals included among the Top 50 jumped 15%, whereas the total output of inorganic chemicals on the list eked out an increase of only 4%.

Worldwide chemical sales of the Top 50 U.S. chemical producers, measured in dollars, scored a rousing 25% advance to a total of $90 billion in 1979—thanks, however, more to strongly rising prices than to higher output. The chemical operations of petroleum refiners, 14 of whom rank among the Top 50, made an especially strong showing because of heavy demand and higher selling prices for petrochemicals in both U.S. and foreign markets. All told, petroleum producers increased their chemical sales 40% during 1979 to more than $25 billion.

Last year, 32 of the 50 leading producers (including 12 petroleum companies) rang up chemical sales of more than $1 billion, eight more than had topped that figure the year before. And five of the 50 sold more than $5 billion worth of chemicals; in 1978 only Du Pont was above that lofty sales level.

50 C&EN's Top Fifty Chemical Products

Output rose last year for most big-volume chemicals

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Last year, for the fourth straight year, total production of the 50 chemicals made in greatest quantity in the U.S. hit new highs.

Output of these chemicals was 565 billion lb. If production grows at the same rate in 1980 as it did in 1979, it will top 600 billion lb. However, production increases may, in fact, slow considerably this year.

The 565 billion lb chalked up last year represents an increase of 7.6% over the revised 525 billion lb of output of the Top 50 chemicals in 1978. The 1979 production figures are largely preliminary, however, so that growth rates may well change when final figures are available. When C&EN's Top 50 list was published last year, the preliminary figures showed a 5.3% increase in production over 1977. However, after the figures for 1978 were revised, the increase was only 4.2%.

Thus, growth for the Top 50 chemicals appears now to be greater than it was in 1978. This gain was led by the 29 organic chemicals on the list, whose output increased 14.8% to 190.2 billion lb from 166.1 billion lb in 1978. The inorganics increased just 4.3% to 374.4 billion lb from 359.1 billion lb in 1978.

It should come as little surprise that production was up strongly in 1979. The indications had been there all year. The Federal Reserve Board's production index for chemicals and allied products shows an increase of 6.6% over 1978. The increase in the index for basic chemicals was not quite so great as that for chemicals and allied products, but it was respectable, nevertheless. The index for basic chemicals averaged 190.9 for 1979, an increase of 4.9% above the 1978 average.

Both of these indexes showed much greater growth than did the much broader index for all nondurable

About the Top 50 list of chemical products

Government data, trade association figures, industry estimates. All of these go into preparing C&EN's annual list of the Top 50 chemical products, ranked by production volume. The federal government is relied upon most heavily, but when government figures are not available, other sources, primarily trade associations, are used. Industry sources and C&EN estimates are used only when other data are lacking or incomplete.

Government data are not always accurate—they are only as good as the information that individual companies report. But they are an objective measure of production extending back for many years. Therefore, relatively accurate indications of growth can be made on a consistent basis.

At this time of year, C&EN has access only to preliminary reports of production for 1979. When the government and trade associations issue their final reports, the outcome can be changed, sometimes dramatically. As a result, production figures for 1978 that appear in the table on page 35 may be different from those published at this time last year. The final reports also can affect the rankings of chemicals. The 1978 rankings of 31 of the chemicals listed in the table on page 35, for example, are different from those in the similar table published by C&EN a year ago.

The list itself covers production figures for the U.S., and includes chemicals produced for export. Candidates for the list include all basic, intermediate, and chemically homogeneous finished products. These range from chemical building blocks such as ethylene and propylene to finished products such as vinyl acetate and ethylene glycol.

The roster also includes basic inorganic chemicals, but does not include what C&EN considers to be minerals, such as salt, potash, gypsum, and sulfur. Lime is included because it is processed and has many chemical and industrial applications. Refractory (dead-burned) dolomite is excluded in the calculations of lime production.

In the organics, such petrochemical feedstocks as ethane, butane, and propane are excluded arbitrarily, because they are considered to be products of oil companies and because they have many nonchemical uses.

There are other gray areas besides lime and petrochemical feedstocks. For example, the basic aromatics—benzene, toluene, and xylene—are included. Admittedly, this makes the list less pure chemically. Mixed xylenes are on the list. So is the para isomer of xylene. If production volume had warranted, the ortho isomer also would be included.

Production figures are published by the government and trade associations in a variety of units—millions of pounds, thousands of tons, billions of cubic feet, millions of gallons, metric tons. To provide an accurate ranking and to make comparison of production volumes easier, C&EN not only gives production in common units but converts production to billions of pounds.

The Top 50 list, in addition to listing production figures for the past two years, indicates growth rates for the past year, the previous year, the past five years, and the past 10 years, giving the reader a historical perspective on growth for each chemical.

Organic chemicals provide most of Top 50 chemicals' growth in 1979

Rank 1979	Rank 1978[a]		Production: Billions of lb 1979	Production: Billions of lb 1978	Production: Common units[b] 1979	Production: Common units[b] 1978	Average annual change 1978–79	Average annual change 1977–78	Average annual change 1974–79	Average annual change 1969–79
1	1	Sulfuric acid	83.98	82.18	41,988 tt	41,088 tt	2.2%	7.1%	4.9%	3.5%
2	2	Lime[c]	38.78	38.78	19,392 tt	19,389 tt	0	2.4	−1.0	−0.1
3	4	Ammonia	36.24	33.89	18,121 tt	16,944 tt	6.9	−3.6	2.9	3.6
4	3	Oxygen	35.35	35.43	427 bcf	428 bcf	−0.2	8.9	1.8	4.5
5	5	Nitrogen	29.92	28.41	413 bcf	392 bcf	5.4	18.4	13.0	12.0
6	6	Ethylene	29.19	25.96	29,187 mp	25,955 mp	12.5	2.1	4.1	5.9
7	8	Sodium hydroxide	24.78	21.42	12,392 tt	10,710 tt	15.7	−2.0	2.1	2.3
8	7	Chlorine	24.22	21.92	12,108 tt	10,960 tt	10.5	3.7	2.4	2.6
9	9	Phosphoric acid	20.27	19.13	10,135 tt	9,563 tt	6.0	6.8	7.1	6.4
10	11	Nitric acid	17.13	16.10	8,564 tt	8,051 tt	6.4	1.3	1.1	1.7
11	10	Sodium carbonate[d]	16.51	16.58	8,253 tt	8,290 tt	−0.4	0	1.6	1.6
12	12	Ammonium nitrate[e]	15.60	14.41	7,800 tt	7,207 tt	8.2	0.4	0.7	2.9
13	13	Propylene	14.30	13.01	14,298 mp	13,013 mp	9.9	1.0	6.4	7.1
14	15	Urea[f]	13.53	10.89	13,534 mp	10,888 mp	24.2	22.5	12.3	8.6
15	16	Benzene	12.72	10.94	1,730 mg	1,488 mg	16.3	−3.1	3.0	3.9
16	18	Toluene[g]	11.86	7.64	1,636 mg	1,054 mg	55.2	−1.2	12.1	8.0
17	14	Ethylene dichloride	11.82	11.00	11,821 mp	11,001 mp	7.5	0	5.2	7.0
18	17	Ethylbenzene	8.53	8.39	8,530 mp	8,385 mp	1.7	0.9	7.1	5.7
19	20	Vinyl chloride	7.54	6.94	7,544 mp	6,941 mp	8.6	16.0	6.1	7.2
20	19	Styrene	7.48	7.19	7,484 mp	7,186 mp	4.0	4.6	4.7	4.9
21	22	Methanol	7.41	6.44	7,411 mp	6,443 mp	15.1	−0.2	1.5	5.8
22	25	Terephthalic acid[h]	7.26	5.95	7,263 mp	5,954 mp	22.0	10.1	11.3	13.9
23	21	Carbon dioxide[i]	7.07	6.69	3,533 tt	3,180 tt	5,7	12.9	13.0	11.7
24	24	Xylene[g]	6.89	6.13	950 mg	845 mg	12.4	0.7	3.4	9.5
25	23	Formaldehyde[j]	6.45	6.38	6,446 mp	6,380 mp	1.1	5.5	2.3	3.9
26	26	Hydrochloric acid	5.95	5.55	2,973 tt	2,773 tt	7.2	1.9	3.8	4.5
27	27	Ethylene oxide	5.28	5.01	5,277 mp	5,012 mp	5.4	14.8	4.7	4.5
28	28	Ethylene glycol	4.60	3.90	4,597 mp	3,903 mp	17.9	6.2	6.6	6.0
29	30	*p*-Xylene	4.18	3.52	4,175 mp	3,516 mp	18.8	10.8	9.1	9.9
30	32	Cumene	4.00	3.38	3,995 mp	3,380 mp	18.3	27.8	6.6	9.0
31	29	Ammonium sulfate	3.94	3.87	1,971 tt	1,943 tt	1.8	−11.0	−1.4	0.3
32	31	Butadiene (1,3-)[k]	3.55	3.52	3,551 mp	3,515 mp	0.9	10.8	−0.7	1.3
33	34	Acetic acid	3.33	2.78	3,329 mp	2,775 mp	19.8	8.0	5.2	6.5
34	33	Carbon black	3.33	3.35	3,329 mp	3,346 mp	−0.6	−0.5	−0.1	2.3
35	35	Phenol[l]	2.95	2.68	2,945 mp	2,682 mp	10.1	14.7	5.1	6.1
36	36	Acetone	2.50	2.52	2,502 mp	2,519 mp	−0.8	13.5	4.8	5.1
37	38	Aluminum sulfate	2.46	2.37	1,232 tt	1,185 tt	3.8	−5.6	−0.3	−0.2
38	39	Cyclohexane	2.41	2.33	2,412 mp	2,331 mp	3.4	4.0	0.5	0.8
39	37	Sodium sulfate[m]	2.34	2.47	1,173 tt	1,239 tt	−5.3	3.4	−2.7	−2.3
40	41	Propylene oxide	2.25	2.05	2,249 mp	2,047 mp	9.8	9.7	5.1	6.7
41	40	Calcium chloride[n]	2.03	2.06	1,015 tt	1,031 tt	−1.5	6.6	−4.0	−1.4
42	42	Acrylonitrile	2.02	1.75	2,018 mp	1,752 mp	15.4	6.4	7.4	5.7
43	44	Vinyl acetate	1.98	1.69	1,983 mp	1,692 mp	16.6	6.7	7.2	10.5
44	43	Isopropyl alcohol	1.97	1.73	1,968 mp	1,730 mp	13.9	−8.4	0.3	−0.5
45	45	Adipic acid	1.80	1.62	1,800 mp	1,621 mp	11.1	5.6	4.0	4.0
46	46	Sodium silicate	1.55	1.60	777 tt	802 tt	−3.1	5.5	0.1	1.7
47	48	Sodium tripolyphosphate	1.51	1.47	756 tt	735 tt	2.7	2.5	−3.5	−4.6
48	47	Acetic anhydride	1.51	1.50	1,505 mp	1,500 mp	0.7	0	−1.6	−1.0
49	49	Titanium dioxide	1.48	1.43	741 tt	718 tt	3.5	4.5	−1.2	2.2
50	50	Ethanol[i]	1.31	1.27	1,308 mp	1,267 mp	3.1	−5.4	4.2	−5.7
		TOTAL INORGANICS IN TOP 50	**374.44**	**359.11**			**4.3%**	**4.5%**	**3.1%**	**3.2%**
		TOTAL ORGANICS IN TOP 50	**190.62**	**166.10**			**14.8%**	**3.4%**	**5.5%**	**6.1%**
		GRAND TOTAL OF TOP 50	**565.06**	**525.21**			**7.6%**	**4.2%**	**3.8%**	**4.1%**

a Revised. b tt = thousands of tons, bcf = billions of cubic feet, mp = millions of pounds, mg = millions of gallons. c Except refractory grade. d Synthetic and natural. e Original solution. f Primary solution. g All grades. h Includes both acid and ester, without double counting. i All forms. j 37% by weight. k Rubber grade. l Synthetic only. m High and low purity. n Solid and liquid. **Sources:** Bureau of the Census, Bureau of Mines, International Trade Commission, C&EN estimates

Plastics once again led polymer growth in 1979

	Billions of lb	Common units					Average annual growth			
	1979	1979	1978	1977	1974	1969	1978–79	1977–78	1974–79	1969–79
PLASTICS (millions of lb)										
Thermosetting resins	**4.86**	**4,857**	**4,488**	**3,943**	**3,494**	**2,852**	**8.2%**	**13.8%**	**6.8%**	**5.5%**
Phenolic and other tar acid resins	1.78	1,781	1,617	1,458	1,335	1,161	10.1	10.9	5.9	4.2
Polyesters (unsaturated)	1.15	1,147	1,209	1,061	911	688	−5.1	13.9	4.7	5.2
Urea resins	1.37	1,367	1,122	963	635	817	21.8	16.5	10.4	5.3
Epoxies (unmodified)	0.36	361	299	261	249	166	20.7	14.6	7.7	8.1
Melamine resins	0.20	200	202	200	164	b	−1.0	1.0	4.1	b
Thermoplastic resins	**28.08**	**28,083**	**25,186**	**22,753**	**20,852**	**12,955**	**11.5%**	**10.7%**	**6.3%**	**8.4%**
Low-density polyethylene	7.79	7,793	7,111	6,471	5,973	3,880	9.6	9.9	5.5	7.2
Polyvinyl chloride and copolymers	6.12	6,119	5,723	5,253	4,850	3,032	6.9	8.9	4.8	7.3
Polystyrene and copolymers	5.32	5,320	5,077	4,630	4,743	3,343	4.8	9.7	2.3	4.8
High-density polyethylene	5.01	5,010	4,201	3,652	2,837	1,610	19.3	15.0	12.1	12.0
Polypropylene and copolymers	3.84	3,841	3,074	2,747	2,249	1,090	25.0	11.9	11.3	13.4
TOTAL[a]	**32.94**	**32,940**	**29,674**	**26,696**	**24,146**	**15,807**	**11.0%**	**11.2%**	**6.4%**	**7.6%**
SYNTHETIC FIBERS (millions of lb)										
Cellulosics	**0.93**	**930**	**905**	**888**	**1,199**	**1,576**	**2.8%**	**1.9%**	**−5.0%**	**−5.1%**
Rayon	0.61	606	597	598	817	1,078	1.5	−0.2	−5.8	−5.6
Acetate	0.32	324	308	290	382	498	5.2	6.2	−3.2	−4.2
Noncellulosics	**9.43**	**9,431**	**8,696**	**8,098**	**6,909**	**4,029**	**8.5%**	**7.4%**	**6.4%**	**8.9%**
Polyester[c]	4.18	4,178	3,800	3,642	2,934	1,315	9.9	4.3	7.3	12.3
Nylon	2.72	2,721	2,550	2,326	2,126	1,411	6.7	9.6	5.1	6.6
Glass fiber	1.01	1,012	923	787	683	501	9.6	17.3	8.2	7.3
Acrylic[d]	0.76	761	726	709	634	533	4.8	2.4	3.7	3.6
Olefin[e]	0.76	759	692	634	531	269	9.7	9.1	7.4	10.9
TOTAL[a]	**10.36**	**10,361**	**9,601**	**8,986**	**8,108**	**5,605**	**7.9%**	**6.8%**	**5.0%**	**6.3%**
SYNTHETIC RUBBER (thousands of metric tons)										
Styrene-butadiene[f]	3.04	1,378	1,395	1,395	1,466	1,424	−1.2%	0.0%	−1.2%	−0.3%
Polybutadiene	0.88	397	377	361	310	268	5.3	4.4	5.1	4.0
Neoprene	0.40	183	161	165	163	204	13.7	−2.4	2.3	g
Ethylene-propylene	0.39	175	174	158	126	76	0.6	10.1	6.8	8.7
Butyl	0.43	194	154	149	164	132	26.0	3.4	3.4	3.9
Nitrile	0.17	75	73	70	88	70	2.7	4.3	−3.2	0.7
Other[h]	0.28	125	138	118	181	310[g]	−9.4	16.9	−7.1	0[g]
TOTAL	**5.57**	**2,527**	**2,472**	**2,416**	**2,498**	**2,285**	**2.2%**	**2.3%**	**0.2%**	**1.0%**

a Totals are only for those products listed. Totals may not add because of rounding. b Data on melamine and urea are combined for 1969. c Includes small amounts of anidex, saran, spandex, vinyon, and TFE-fluorocarbon yarn and monofilament. d Includes modacrylic. e Includes vinyon staple and tow. f Excludes high-styrene latex. g Data for neoprene and "other" are combined for 1969. h Includes polyisoprene, chlorosulfonated polyethylene, polyisobutylene, acrylic, fluoro, polysulfide, and silicone elastomers. Excludes polyurethane elastomers.
Sources: Society of the Plastics Industry, International Trade Commission, Textile Economics Bureau, Rubber Manufacturers Association, Bureau of the Census

manufacturing, of which they both are part. The broader index averaged 163.3 for 1979, an increase of 4.1% from 1978.

Last year, output increased for 42 of the Top 50 chemicals. In 1978, production had increased for just 37 of the chemicals. For only seven of the Top 50 did production decline last year from the year before, compared to 10 whose output declined in 1978 from 1977. Production was static for only one product in 1979—lime—compared to three the year before—sodium carbonate (soda ash), ethylene dichloride, and acetic anhydride.

Production of 17 of the chemicals increased more than 10% in 1979. In 1978, just 10 showed increases of 10% or more. Indeed, three chemicals on the list—toluene, urea, and terephthalic acid—had increases in output of more than 20% in 1979. In 1978, only urea and cumene output increased more than 20%, with cumene's 27.8% growth the greatest for that year.

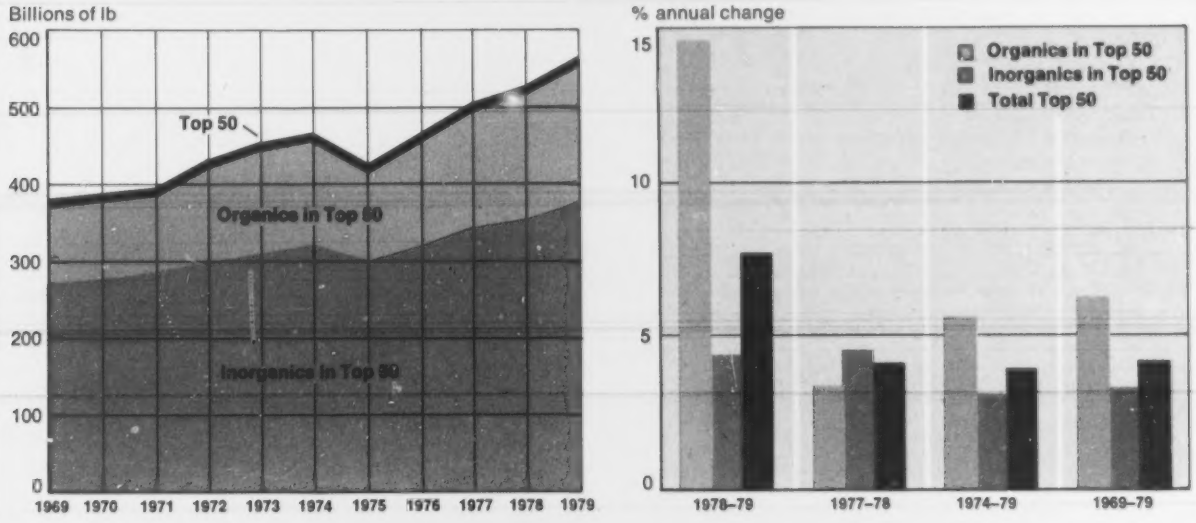
The biggest annual percentage growth in 1979 was for toluene, at 55.2%. The year before toluene production had declined 1.2%. Industry observers attribute much of last year's greater output to toluene's relatively new use as a blending agent to raise the octane rating of unleaded gasoline. As a result, toluene in 1979 moved to 16th place on the 1979 Top 50 list from 18th the year before. Toluene was also the largest gainer in terms of physical output. Production of toluene was 11.86 billion lb (1636 million gal) in 1979, a gain of 4.22 billion lb from 1978.

Production declines in 1979 were generally small compared to some registered in past years. The largest percentage decline was 5.3% for sodium sulfate. Most of the declines, however, for 1979 amounted to less than 1%. In 1978, all but two of the declines in production were greater than 1%, with the biggest loser being ammonium sulfate, off 11%.

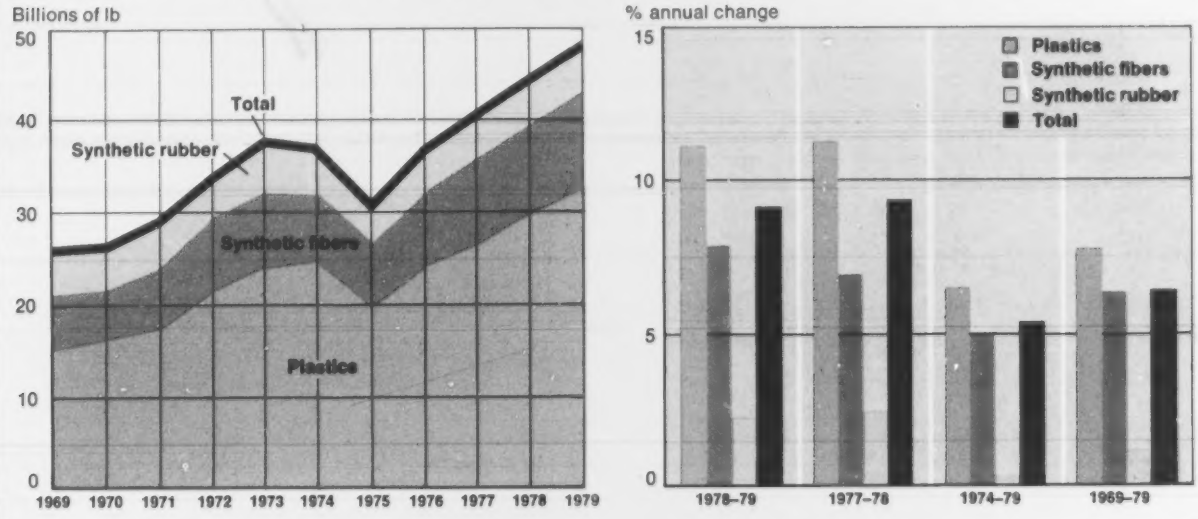
The biggest volume loser in 1979 was also sodium sulfate, with output off 140 million lb from 1978.

The biggest drop in rank last year was for ethylene dichloride, which fell to 17th place from 14th in 1978, in

Organics now account for a third of Top 50 chemicals output...



...thanks to two years of hefty growth for plastics



spite of a 7.5% increase in output for the year, as other products produced in about the same volume turned in much better advances.

Production of the basic chemicals—especially the organics—was spurred in 1979 by gains in production of downstream products, especially plastics.

Overall production of plastics increased 11.0% in 1979, slightly less than the increase of 11.2% scored in 1978. The difference is largely accounted for by smaller production gains for the thermosetting resins. Thermosets output gained 8.2% in 1979 from 1978, compared to a rise the year before of 13.8%. Thermoplastics did better in 1979, with output climbing 11.5% over 1978 production. In 1978, output of thermoplastics increased 10.7%. The biggest gainer for 1979 among the plastics was polypropylene, with a 25% increase in production.

Growth for synthetic fibers was better in 1979 than during the year before. Output increased 7.9%, compared to a 6.8% gain in 1978. Cellulosic fibers continued their lackluster performance, increasing just 2.8% over the year before. However, the noncellulosic fibers made up for this with an advance in production of 8.5% over 1978, paced by polyester with a 9.9% gain.

Synthetic rubber once again turned in a smaller growth rate than did the other polymeric products, with only a 2.2% production gain over 1978. In 1978, output had increased 2.3%. There were, however, two good gainers among the synthetic rubbers: Butyl rubber production increased 26% from 1978 and neoprene output climbed 13.7%.

After the very good year for chemical production in 1979, predictions for 1980 are anybody's guess. The consensus among economists is that there will be a recession this year which probably already has started. Just how long and how deep it will be is uncertain. Also uncertain is whether the recession will cause an actual decline in chemical production. The 1974–75 recession was the only postwar economic downturn during which chemical production actually declined year to year. □

50 C&EN's Top Fifty Chemical Producers

Rising prices spur sales of leading chemical producers

David M. Kiefer
C&EN, Washington

The heavy hand of inflation shows up clearly in the latest of C&EN's annual rankings of the 50 leading producers of chemicals in the U.S. All of the companies comprising C&EN's Top 50 group sold more chemicals last year than in 1978—with most of them tallying impressive gains. For the 50 as a whole, sales of chemical products totaled $90 billion. That's an increase of 25% from the previous year—and well more than double the amount just six years ago. It is also the greatest year-to-year increase since 1974, when sales jumped 40%.

As was the case five years earlier, though, the increase last year is more a reflection of higher selling prices than of increased physical volume of output. Production of basic chemicals and synthetic materials in the U.S. was up about 7% in 1979. But under the pressure of rising raw material and energy costs, prices of most chemical products rose strongly. Selling prices of industrial chemicals averaged about 17% higher for the year, according to the Bureau of Labor Statistics, and plastics prices rose 18% from 1978. Even so, prices of many chemicals produced in the U.S. compared favorably with those made overseas, so that sharply increased foreign business also bolstered the results turned in by U.S. firms. At the same time, expanded capacity and higher operating rates helped drive sales to a new high.

With oil prices rising inexorably throughout 1979, prices of petrochemicals and their derivatives, in particular, were forced upward. The result was a big gain in sales volume for their producers, especially the 14 oil refiners with a large stake in chemical markets who are among the Top 50. Exxon, for example, boosted its chemical sales 44% and moved up two levels in C&EN's Top 50 ranking into third place. Texaco, meanwhile, with an increase in chemical sales of 53% climbed nine places in the ranking to 28th. Phillips Petroleum and Atlantic Richfield, both of which scored a 52% advance in chemical sales last year, likewise moved several spots higher on the list.

All in all, the 14 petroleum companies among the Top 50 increased their sales of chemicals 40% in 1979. They now account for nearly 30% of the 50 companies' total chemical sales, compared with 25% in 1978.

The biggest increase in chemical sales for any of the Top 50, however, was chalked up by Tenneco. The big conglomerate has vaulted into 20th ranking in the compilation on the strength of an 82% increase in its chemical sales last year, following a 69% rise the year before. In 1977, the company was not ranked among the Top 50. Strong demand for Tenneco's chemical products gets only part of the credit for its higher sales, however. An even bigger factor during the past two years has been its consolidation of sales from its big British subsidiary, Albright & Wilson, since Tenneco acquired full ownership of that company in September 1978.

Another nonchemical company that has pushed its chemical sales up significantly is U.S. Steel. The leading steel producer brought seven major chemical projects, with a potential annual sales volume of about $350 million at current prices, on stream during 1979. U.S. Steel plowed $280 million into new chemical plant and equipment last year, four times what it invested in such projects only two years earlier, and its sales of chemicals have doubled since 1976.

But diversification works both ways. Although companies like Tenneco and U.S. Steel have been getting a bigger share of their sales dollar from chemicals, for a few of the old-line chemical producers ventures in other areas have trimmed the contribution of chemicals to their overall business. Last year, for instance, chemicals accounted for just 50% of Allied Chemical's total sales, down from 68% five years earlier. During the same period, Diamond Shamrock's sales of chemicals slipped to 52% from 65% of its total volume. Both companies now get a significantly greater proportion of their revenues from oil and gas operations.

Although their place in the rankings has changed in many cases, the producers included on 1979's Top 50 list are identical with the Top 50 of the year before. For the first time, all the companies on the list have chemical sales of more than $500 million. At least a few other U.S. producers sold more than $500 million worth of chemicals last year, as well. Cities Service, for one, rang up $527 in chemical volume. C&EN estimates, too, that both Goodyear Tire and ICI Americas, the U.S. subsidiary of Britain's Imperial Chemical Industries, probably sold $500 million or more, although neither discloses its chemical volume separately from other products.

In ranking the Top 50 chemical producers in terms of their chemical sales, C&EN defines "chemicals" to include industrial chemicals, plastics and resins, man-made fibers, synthetic rubber, fertilizers and pesticides, and various industrial specialty products. Excluded, as far as possible, are such related products as pharmaceuticals, coatings, fabricated plastics, detergents, chemical minerals such as sulfur or phosphate rock, and finished consumer items. Companies themselves, however, do not necessarily classify their chemical operations along these same lines. Therefore, the total "chemical" sales of one firm really may not be comparable with those reported by another. C&EN adjusts the data with its own estimates whenever possible to make them more consistent. Nevertheless, the rankings of the Top 50 should be considered as only approximate. □

Chemical sales top $1 billion for nearly two thirds of Top 50 chemical producers

Rank 1979	Rank 1978[a]	Company	Chemical sales 1979 ($ millions)	Change from 1978	Total sales 1979 ($ millions)	Chemical sales as % of total sales	Industry classification	TOTAL COMPANY Net income ($ millions)	Profit margin[b] Per cent 1979	Profit margin[b] Rank 1979	Profit margin[b] Rank 1978	Return on stockholders' equity[c] Per cent 1979	Return on stockholders' equity[c] Rank 1979	Return on stockholders' equity[c] Rank 1978
1	1	Du Pont	$9700	20%	$12,572	77%	Basic chemicals	$ 938.9	7.5%	13	10	18.0%	14	9
2	2	Dow Chemical	6634	33	9,255	72	Basic chemicals	783.9	8.5	7	8	20.1	7	6
3	5	Exxon	5807	44	79,106	7	Petroleum	4295.2	5.4	29	32	19.0	11	19
4	3	Union Carbide	5300[d]	14	9,177	58	Basic chemicals	556.2	6.1	22	23	13.8	34	35
5	4	Monsanto	5215	21	6,193	84	Basic chemicals	331.0	5.3	30	16	11.9	40	32
6	7	Celanese	3010	23	3,146	96	Basic chemicals	141	4.5	37	35	13.6	36	31
7	6	W. R. Grace	2619[d]	2	5,267	50	Specialty chemicals	222.6	4.2	38	37	14.2	33	29
8	8	Shell Oil	2599	37	14,431	18	Petroleum	1125.6	7.8	11	11	16.1	23	23
9	11	Gulf Oil	2437[d]	43	23,910	10	Petroleum	1322	5.5	28	34	15.2	28	39
10	9	Allied Chemical	2150	16	4,332	50	Basic chemicals	175.6	4.1	39	22	14.3	32	30
11	10	Hercules	2039	19	2,345	87	Basic chemicals	172.5	7.4	14	20	18.2	13	26
12	12	Occidental Petroleum	1994[d]	20	9,555	21	Petroleum	561.6	5.9	26	49	33.0	1	48
13	15	Standard Oil (Ind.)	1958	50	18,610	11	Petroleum	1506.6	8.1	9	13	18.0	15	14
14	20	Phillips Petroleum	1693	52	9,503	20	Petroleum	891.1	9.4	5	5	20.9	6	4
15	13	American Cyanamid	1685[d]	18	3,187	53	Basic chemicals	168.5	5.3	31	19	12.5	39	28
16	21	Atlantic Richfield	1662	52	16,234	10	Petroleum	1165.9	7.2	15	14	19.1	10	12
17	14	Eastman Kodak	1576	17	8,028	20	Photographic equipment	1000.8	12.5	2	2	18.6	12	5
18	16	Stauffer Chemical	1496	15	1,526	98	Basic chemicals	136.0	8.9	6	6	16.0	25	8
19	19	Rohm & Haas	1479	30	1,590	93	Basic chemicals	95.5	6.0	23	31	15.0	29	38
20	31	Tenneco	1470[d]	82	11,209	13	Petroleum	571	5.1	32	21	15.4	26	17
21	17	Borden	1454[d]	16	4,313	34	Dairy products	134.0	3.1	42	38	11.3	41	25
22	18	Ethyl Corp.	1440[d]	17	1,657	87	Basic chemicals	97.5	5.9	25	17	16.1	24	13
23	23	Mobil	1325	32	44,721	3	Petroleum	2007.2	4.5	36	39	19.1	9	27
24	22	Diamond Shamrock	1234	23	2,357	52	Basic chemicals	178.1	7.6	12	9	17.5	17	11
25	33	U.S. Steel	1207	58	12,929	9	Steel	(293.0)[e]	—	—	—	—	—	—
26	24	FMC	1135	14	3,307	34	Farm and construction machinery	151.6	4.6	35	26	13.1	38	21
27	25	Air Products[f]	1062	16	1,230	86	Basic chemicals	97.5	7.9	10	12	17.2	18	10
28	37	Texaco	1047	53	38,350	3	Petroleum	1759.1	4.6	34	41	16.5	21	42
29	30	BASF Wyandotte	1045	28	1,103	95	Basic chemicals	9.7	0.9	48	40	3.7	47	36
30	29	Standard Oil of Calif.	1043	26	29,948	3	Petroleum	1784.7	6.0	24	28	19.2	8	20
31	28	B. F. Goodrich	1041	21	2,988	35	Rubber products	82.6	2.8	44	42	9.2	44	43
32	26	Ashland Oil	1017	15	6,474	16	Petroleum	186.4	2.9	43	45	17.5	16	40
33	27	PPG Industries	972	10	3,092	31	Glass products	218.9	7.1	16	27	16.4	22	34
34	38	American Hoechst	968	42	1,174	82	Basic chemicals	30	2.6	45	45	na	—	—
35	32	Mobay Chemical	955	23	955	100	Basic chemicals	58.1	6.1	21	30	16.8	20	24
36	39	Union Oil of Calif.	865	28	7,568	11	Petroleum	500.6	6.6	17	15	16.9	19	15
37	41	Ciba-Geigy	844	27	1,320	64	Specialty chemicals	na	na	—	—	na	—	—
38	42	Williams Cos.	840	27	1,850	49	Agricultural chemicals	69.5	3.8	41	48	9.3	43	47
39	34	Olin	823	15	1,778	46	Basic chemicals	71.2	4.0	40	36	9.6	42	41
40	35	Reichhold Chemicals	794	14	875	91	Basic chemicals	12.2	1.4	47	47	6.2	46	45
41	42	Conoco	792	32	12,648	6	Petroleum	815.4	6.3	19	29	21.6	5	16
42	36	International Minerals[g]	780	12	1,475	53	Agricultural chemicals	120.8	8.2	8	7	15.3	27	7
43	40	National Distillers	773	16	2,115	37	Alcoholic beverages	135.8	6.4	18	24	13.3	37	37
44	44	Lubrizol	725	24	725	100	Specialty chemicals	90.8	12.5	1	1	24.2	2	2
45	48	Dow Corning	610	27	610	100	Specialty chemicals	71.5	11.7	3	3	21.8	4	3
46	50	Borg-Warner	595	26	2,717	22	Automobile equipment	155.6	5.7	27	18	14.4	31	18
47	49	Nalco Chemical	579	22	579	100	Specialty chemicals	63.3	10.9	4	4	24.2	3	1
48	46	Akzona	576	11	1,012	57	Basic chemicals	25.6	2.5	46	43	7.9	45	44
49	47	Pennwalt	562	17	1,079	52	Basic chemicals	50.0	4.6	33	25	13.7	35	22
50	45	NL Industries	537	1	1,810	30	Basic chemicals	114.6	6.3	20	33	14.7	30	33

a Revised. b Net income as a percentage of net sales. c Net income as a percentage of net worth. d Chemical sales include significant amounts of nonchemical products, such as fabricated plastics, coatings, metals, minerals, and the like. e Deficit. f For the year ended Sept. 30. g For the year ended June 30. na = not available. **Note:** Industry classifications are based largely, but not entirely, on the federal Enterprise Standard Industrial Classification system.